

PATENT CLAIMS

1. A method for estimating a value of a vector of variables p in a mathematical model representing a physical process, where a state vector x of the model is estimated by a State Augmented Extended Kalman Filter (SAEKF),

characterized in that the vector of variables p represents one or more properties of the process and is representable by a function of the state vector x ,

and that the method comprises the steps of

- a) measuring values for measured variables u ,
- b) incorporating the vector of variables p as an augmented state in the SAEKF, and
- c) computing an estimate of the complete state including the augmented state according to a SAEKF algorithm.

2. Method according to claim 1, wherein system equations of the model estimated by the SAEKF are representable as

$$\begin{bmatrix} \dot{x} \\ \dot{p} \end{bmatrix} = \begin{bmatrix} f(x, u, p) \\ 0 \end{bmatrix} + v$$

where $f(x, u, p)$ represents a known dependency of the change \dot{x} in system state from the system state x , the measured values u and the vector of variables p , and v represents noise disturbances.

3. Method according to one of claims 1 to 2, comprising the step of estimating parameters of a representation of the vector of variables p in terms of the state vector x .
- 5 4. Method according to one of claims 1 to 3, wherein the physical process comprises a turbomachine, and the vector of variables p represents at least one of an efficiency or a mass flow rate of the turbomachine.
5. Method according to one of claims 1 to 3, wherein the physical process
10 comprises a heat exchanger, and the vector of variables p represents at least one heat transfer coefficient of the heat exchanger.
6. Method according to one of claims 1 to 3, wherein the physical process
15 comprises a mating gear transmission, and the vector of variables p represents a backlash and spring function.
7. Method according to one of the preceding claims, where a Recursive-Prediction-Error-Method is used instead of the SAEKF.
- 20 8. Computer program for estimating a value of a vector of variables p in a mathematical model representing a physical process which is loadable and executable on a data processing unit and which computer program, when being executed, performs the steps according to one of the preceding claims.

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9. Data processing system comprising means for carrying out the steps of the method according to any one of the claims 1 to 7.